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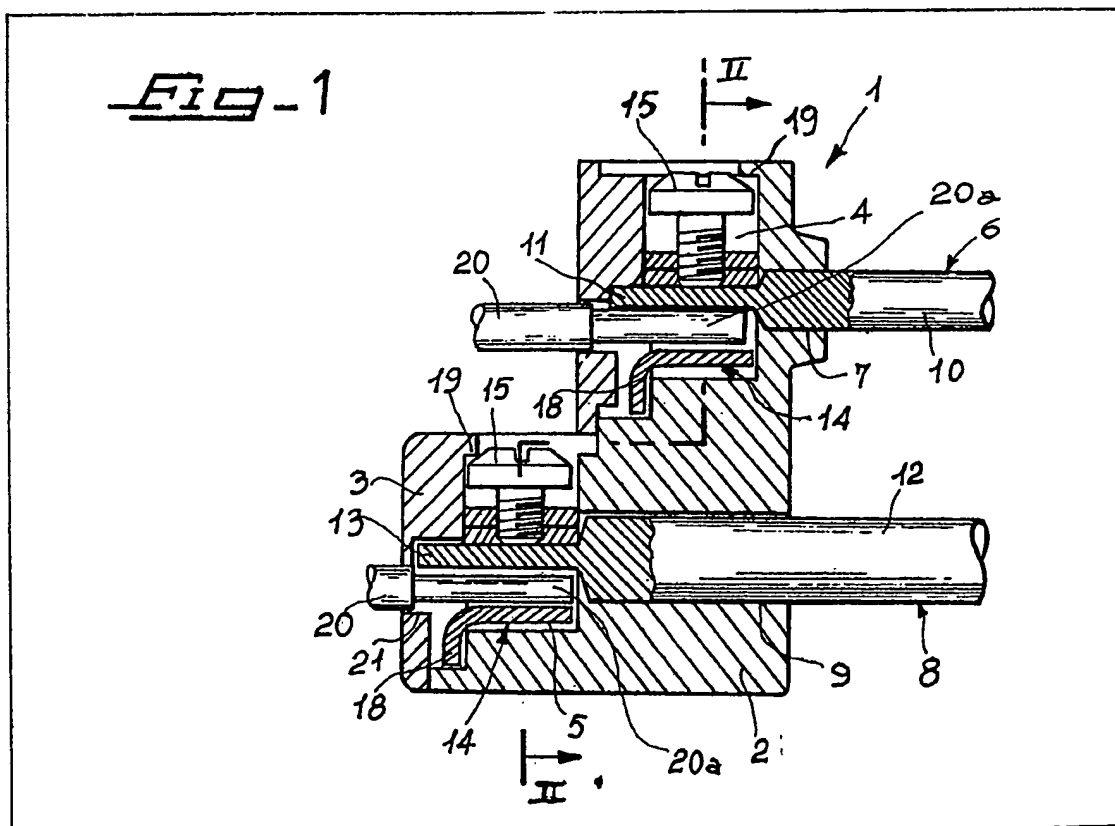
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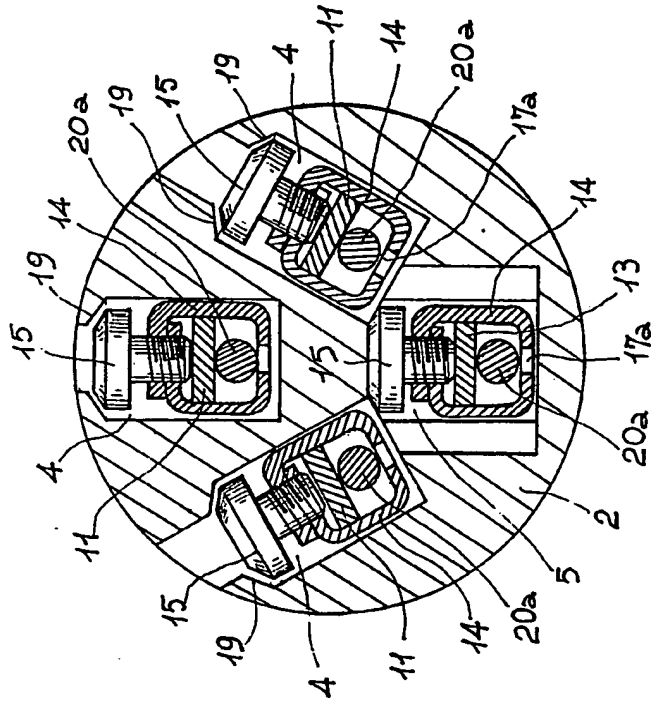
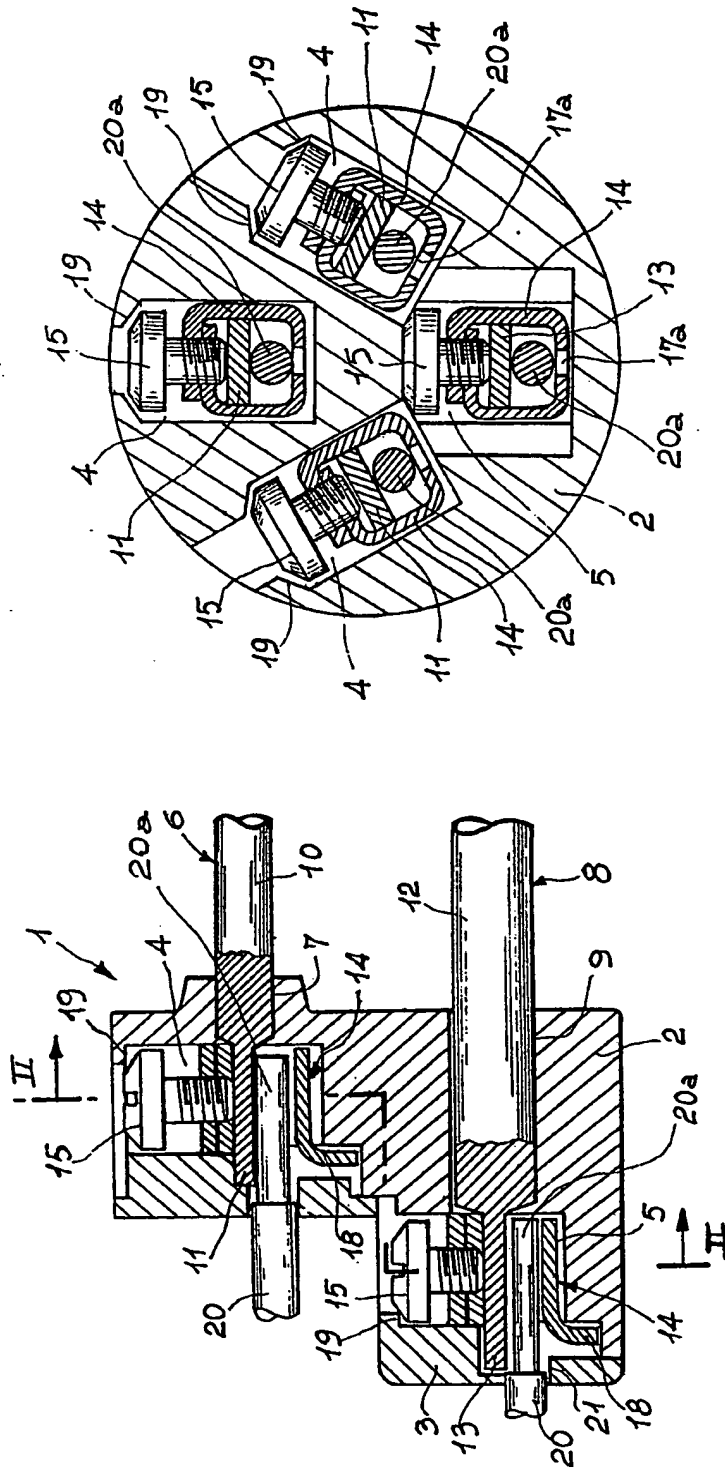
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(54) Wire clamping structure for  
 electrical sockets and plugs

(57) A wire clamping structure for  
 electrical sockets and plugs consists of  
 a ring closed slider 14 in which a  
 plate-shaped end 11 or 13 of a pin 6 or 8  
 or a bush is engageable, said slider  
 being suitable to slide to-and-fro in a  
 corresponding cavity, perpendicularly  
 to the axis of said pin or bush and being  
 provided with a threaded hole in which  
 a clamping screw 15 is inserted causing  
 the slider to move laterally, thus  
 clamping the wire between said  
 plate-shaped end of the pin or bush and  
 the slider inner surface opposite to the  
 hole.



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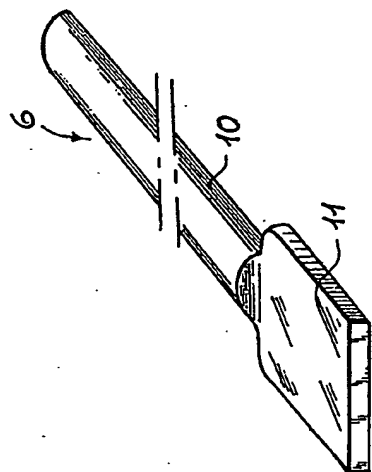


Fig. 4

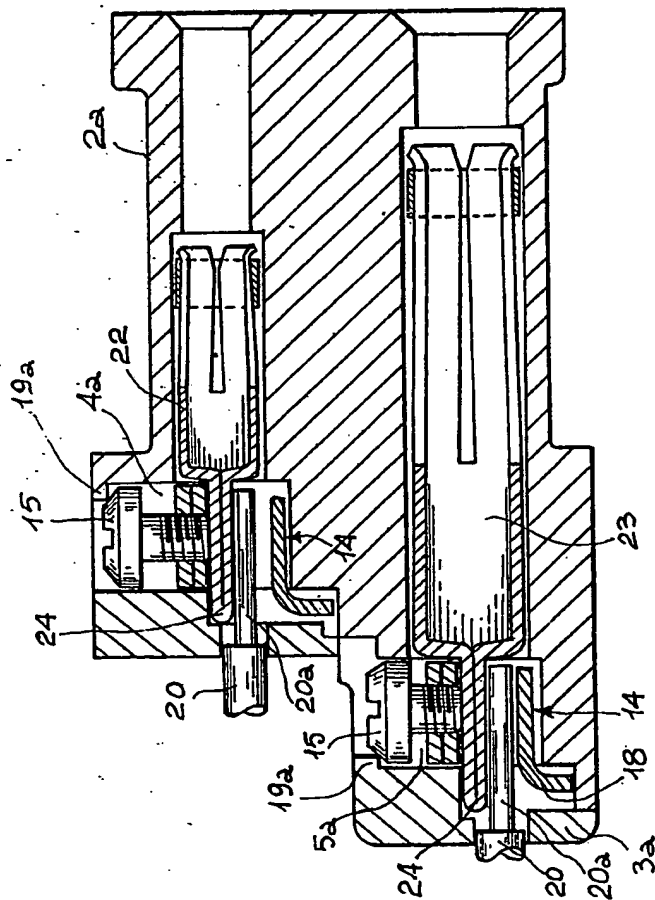
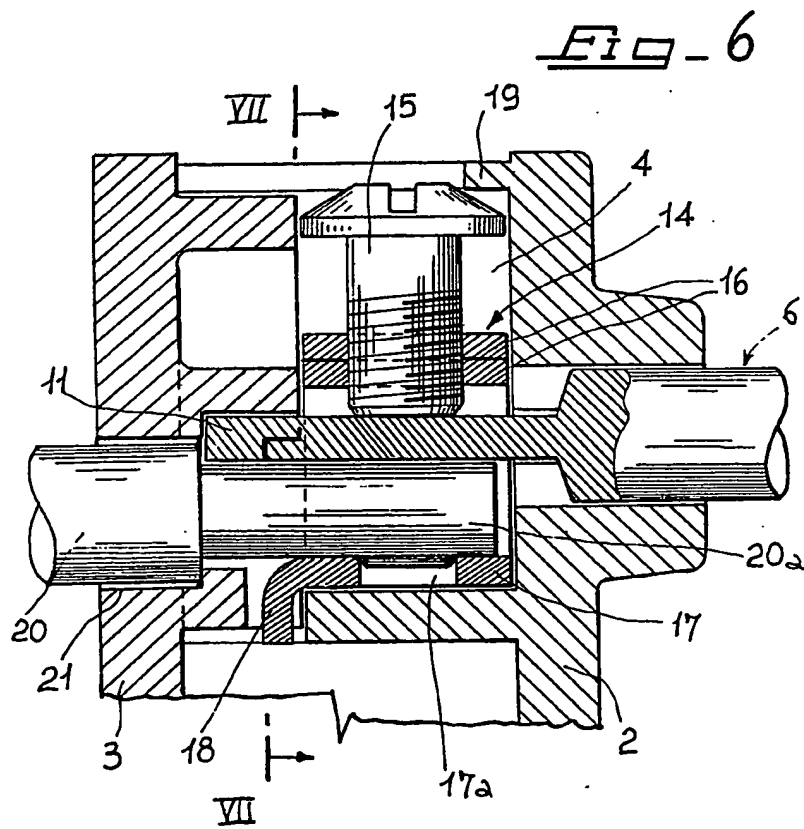
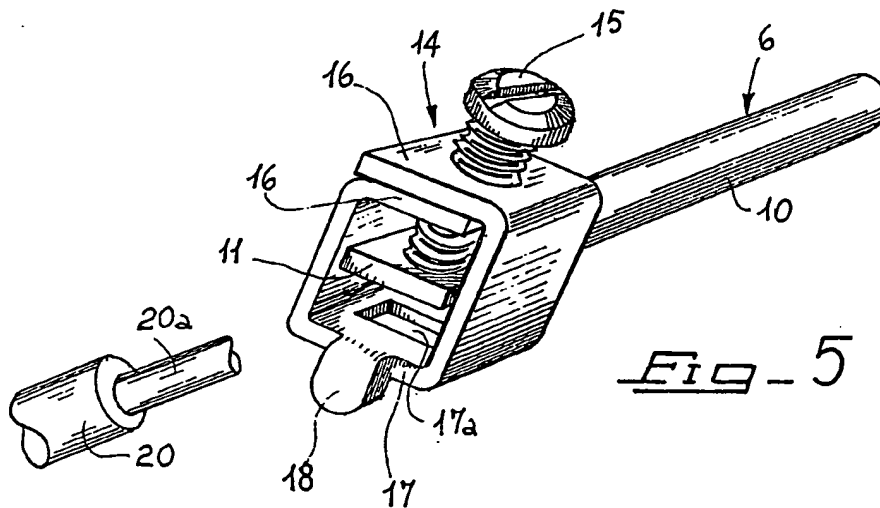
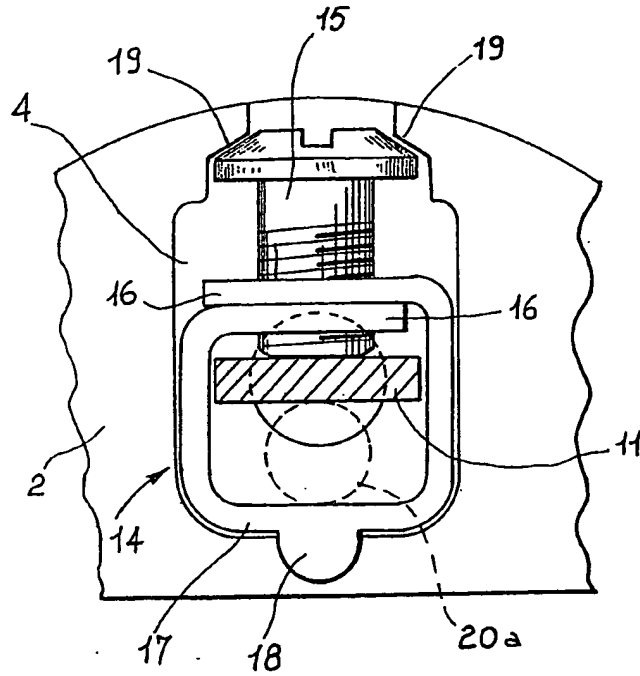
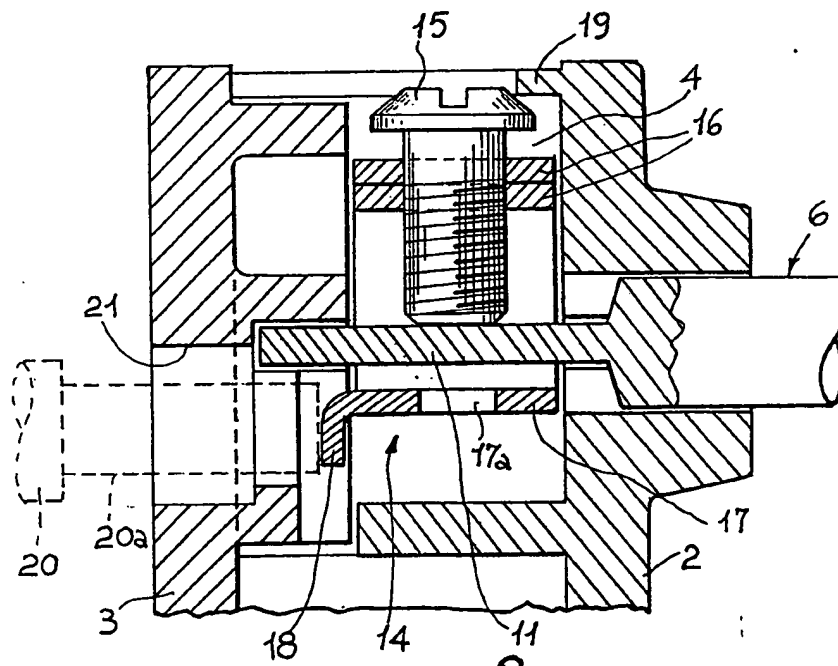


Fig. 3



Fig - 7Fig - 8

## SPECIFICATION

## Wire clamping structure for electrical sockets and plugs

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The present invention relates to a wire clamping structure for electrical sockets and plugs of the kind including a box-type body formed from insulating material in which a plurality of housings suitable to contain a plurality of contact pins are defined and a box-type body of insulating material too, in which housings suitable to contain an equal number of contact bushes are defined.

More particularly, the invention concerns a structure for sockets and plugs of industrial type, though it can also be utilized in ordinary sockets and plugs for domestic use.

At present, in order to obtain the clamping of wires connected to electrical sockets and plugs different structures are utilized in which the same wires are differently locked through a clamping screw.

According to a traditional system, the contact elements (pins and bushes) are provided, at one end thereof, with an axial hole in which the wire to be connected is introduced by its head. One or more clamping screws, passing through corresponding holes provided radially on the circular wall defining said axial hole, secure the wire to the pin or bush concerned.

However, such a system has some drawbacks in relation to the tightening of the screws. In fact, when the screws are tightened, they tend to wedge themselves in the wire, thus partly breaking the metal filaments generally forming the wire. In this way the wire cross section is locally reduced and therefore the electrical resistance is varied, giving rise to unavoidable increases in intensity of current which may produce dangerous effects. Furthermore, it is to be noted that whenever a socket or a plug has to be replaced, before carrying out the connection the user is obliged to accomplish a series of operations such as to cut off the length of damaged wire, to take away a part of the insulating sheath and to twist the portion of naked wire. It is also necessary to remember that a subsequent untightening of the screw in order to introduce the wire may cause the complete coming out of the same screw which may even be lost. In any case these operations involve a considerable loss of time during the installation.

According to recent studies of the same applicant, another type of clamping structure has been accomplished in which the naked end of the wire is clamped between a plate-shaped end portion of the pin or of the bush and a small flat plate provided with a threaded hole designed for the screwing of the clamping screw, this screw centrally crossing said plate-shaped portion of the pin or of the bush.

By this arrangement the clamping screw does not thrust it-self tightly into the wires. However the clamping of the wire does not take place in a quite rational way as the wire is positioned to the side of the clamping screw, in an offset position; furthermore, the clamping itself cannot be completely satisfactory, due to the possible mutual inclination of the clamping surfaces and to the eccentricity of the line

of application of the clamping force with respect to the position of the wire inserted therein.

The main object of the present invention is to eliminate the drawbacks mentioned above relative to the normally used systems, by accomplishing a wire clamping structure for electrical sockets and plugs in which the wires can be always efficiently clamped in a perfectly centered position and at the same time avoiding the risk that the screw wedges itself into the wire, thus reducing the cross section thereof.

A further object of the invention is to accomplish a structure of the type described above through which electrical connections can be carried out very quickly and easily without any possibility of errors in inserting the wires in their clamping housings.

A further object of the invention is to accomplish a clamping structure which is easy to make, cheap and reliable even after a long period of use.

These and other objects and advantages of the present invention which will become evident from the description which follows are achieved by the wire clamping structure for electrical sockets and plugs according to the present invention, of the kind including a box-type body formed from insulating material in which a plurality of housings suitable to contain a plurality of contact pins are defined and a box-type body of insulating material too, in which housings suitable to contain an equal number of contact bushes are defined, characterized in that in each pin and in each bush the end portion suitable to be connected to the wires is plate-shaped and is transversely inserted into a ring forming closed slider, suitable to slide to-and-fro within a corresponding cavity according to a direction perpendicular to the axis of said pin or bush and provided with a threaded hole allowing the screwing of a clamping screw which engages, at one end thereof, with said plate-shaped portion of a pin or bush and, at the other end thereof, with a fixed shoulder so that, tightening or untightening the screw itself in said slider, the latter moves to-and-fro in said direction, the wire to be connected, in its clamping state, being locked between said plate-shaped portion and the slider inner surface opposite to the screwing hole of the clamping screw.

By means of such a structure the wire can be easily and efficiently locked between two opposite surfaces in a central position with respect to the clamping screw, without need for the clamping screw to engage with the wire directly.

Further features and advantages of the invention will appear more evident from the detailed description of a wire clamping structure for electrical sockets and plugs given hereinafter, by way of example only, with reference to the accompanying drawings, in which:

- Figure 1 is a longitudinal section of a plug provided with the clamping structure of the invention;
- Figure 2 is a section along line II-II of Figure 1;
- Figure 3 is a longitudinal section of a socket provided with the clamping structure of the invention;
- Figure 4 is a perspective view of a pin;
- Figure 5 is a perspective view of a pin coupled

to its corresponding wire clamping member;

— Figure 6 shows, on an enlarged scale, a detail of Figure 1;

— Figure 7 is a view according to arrows VII-VII of Figure 6;

5 Figure 6;

— Figure 8 shows the same detail as in Figure 6, but in no use conditions.

Referring particularly to Figs. 1 and 2, it has been indicated at 1 as a whole an electric plug comprising a box-type body 2 of insulating material, having a substantially cylindrical shape, laterally closed by a cover 3 of insulating material too. The mutual assembling of the box-type body 2 and the cover 3 defines a plurality of hollow housing 4 (three in the example of the drawings) having substantially rectangular sections and lying in the same transverse plane, and a further hollow housing 5, having a rectangular section too, the axis of which is spaced apart in a predetermined manner from the plane containing the axes of the hollow housings 4.

Contact pins 6 are provided in each housing 4, being introduced in holes 7 of the body 2. Likewise, another pin 8 for the earthing, introduced in a corresponding hole 9 is provided in the housing 5. As shown in Figure 4 too, the pins 6 consist of a cylindrical rod 10 ending with a rectangular plate-shaped end 11, lying in the axis of said rod. Also the ground pin 8 has the same shape, the only difference being that the longitudinal and transverse sizes of rod 12 are bigger than the rod of pins 6 while the plate-shaped end portion 13 has the same size as pins 6.

The plate-shaped portions 11 and 13 are located in the housings 4 and 5 respectively and they extend over the same, so that they penetrate for a short way into corresponding recesses presented by the inner surface of cover 3; in this way, after the placing of the cover, the pins 6 and 8 cannot rotate about their respective axes and the plate-shaped portions 11 and 13 are kept fixed in a transverse position within the housings 4 and 5.

The plug 1 will be provided with a number of pins 6 depending on the type of polarity of the plug (two if the plug is bipolar, three if it is of the threepole kind, etc.) plus the ground pin 8.

In each of the hollow housings 4 and 5 there is also located a ring-forming closed slider, in which an operating screw can be screwed. More particularly, the slider 14 is formed from a metal strip which is bent in order to get a square or rectangular shape (figures 5 and 7), its end edges 16 being overlapped and provided with threaded holes mutually aligned in order to allow the passage of the screw 15. Furthermore, the side 17, opposite to said end edges 16, is provided with a central slit 17a and a tongue 18 having a 90° bending and projecting laterally in a mean position, the use of which will be explained later.

Owing to its sizes, the slider 14 can be exactly accommodated in the hollow housings 4 and 5, so that the walls of the latter act as a guide to the reciprocating sliding of the slider itself in a direction perpendicular to the axes of the pins. After the assembling, the plate-shaped end portions 11 and 13 of the pins appear transversely inserted in the corresponding sliders 14, as shown in Figs. 2, 5 and 7.

65 The hollow housings 4 and 5 are also provided

with shoulders 19 (obtained in the body 2) suitable to constitute a stop for the screw heads 15, as the points of the same screws come into engagement with the plate-shaped portions 11 and 13 of the pins (Fig. 2). In this way the screws can rotate about their respective axes but they cannot move in the axial direction, so that the rotation of the screws causes a shifting in one direction or in the other of the respective sliders 14.

75 In accordance with the known art, the wires 20 to be connected to the pins must have their end 20a devoid of the insulating sheath, in order to allow the electrical contact. This end is inserted in its respective slider 14 and exactly between the side 17 of the slider itself and the plate-shaped portion 11 or 13 of the concerned pin, as clearly shown in Figs. 1, 2 and 6. After this insertion, by means of a normal screwdriver, the screw 15 is screwed in the slider edges 16; by this screwing, as the screw-point is stopped by the plate-shaped portion 11 or 13 of the pin, there is a shifting of the slider 14 towards the screw head, so that the end 20a of the wire is efficiently locked between the slider side 17 and said plate-shaped portion of the pin.

90 It is also provided that the end 20a of the wire is centrally placed with respect to the screw 15 so that a rational and sure locking is obtained. For this purpose, holes 21 are provided in the cover 3, allowing the passage of the wires, these holes being conveniently positioned in register with the axes of sliders 14.

100 It is to be noted that after the assembling of the different parts and the adjustment of the cover (which can be fitted into the body 2 or fixed by means of screws) the screws 15 get trapped into the housings 4 and 5 and cannot be lost.

If the wires 20 have to be disconnected it is necessary to act in the opposite way with respect to what above described, rotating the screws 15 in the untightening direction. In so doing, as the screw heads are stopped by the shoulders 19, there is a shifting of the sliders 14 which move away from the heads themselves, so that the ends 20a of the wires get free and can therefore be taken off.

110 In order to obtain the most reliable anchoring, a slit 17a can be provided on the side 17 of each slider 14. As shown in Fig. 6, by tightly screwing the screw 15, it is possible to obtain a certain deformation of the naked end 20a of the wire, so that the wire itself can penetrate into the slit 17a.

115 The tongue 18 provided in each slider 14 is of no use when the wire is locked (Fig. 6) and is housed in a recess existing between the body 2 and the cover 3. However, before the assembling it prevents the wire from entering in a wrong position. In fact, as shown in Fig. 8, when untightening the screw, the slider approaches the screw head and the tongue 18 is brought into line with the hole 21 in which the wire has to be introduced, so that the latter cannot be inserted in a wrong position, between the slider and the wall of the housings 4 or 5.

120 The above described clamping structure is used in the same manner in the case of sockets, as shown in Fig. 3. Referring to this figure, it has been indicated at 22 a contact bush and at 23 a ground bush, the

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latter having bigger sizes than bushes 22. Both types of bushes 22 and 23 have a rectangular plate-shaped end 24 quite similar to portions 11 and 13 of the pins.

The plate-shaped portions 24 of bushes 22 and 23 are inserted into sliders 14, having the same shape as described above, these sliders and their respective screws 15 being accommodated in hollow housings 4a and 5a quite similar to the housings 4 and 5 of the plug.

As described above about the plug, the assembling of a body 2a and a cover 3a of a socket defines housings 4a and 5a; in this case too, shoulders 19a suitable to engage with the screw heads are provided in the same housings.

As regards the clamping of wires 20, the same arrangements and modalities as in the case of a plug are adopted.

It is evident that the clamping structure according to the present invention allows an easy and rational connection of wires both to sockets and to plugs, keeping the wires perfectly in the middle of the contact zone with respect to the operating screws and securing a very reliable anchoring and very quick interventions at the time of the installations and in the cases of replacements or disconnections.

The embodiments of the invention described above are not intended to comprise a limitation, and modifications can be carried out within the scope of the claims.

#### CLAIMS

1. A wire clamping structure for electrical sockets and plugs, of the kind including a box-type body formed from insulating material in which a plurality of housings suitable to contain a plurality of contact pins are defined and a box-type body of insulating material too, in which housings suitable to contain an equal number of contact bushes are defined, characterized in that in each pin and in each bush the end portion suitable to be connected to the wires is plate-shaped and is transversely inserted into a ring-forming closed slider, suitable to slide to-and-fro within a corresponding cavity according to a direction perpendicular to the axis of said pin or bush and provided with a threaded hole allowing the screwing of a clamping screw which engages, at one end thereof, with said plate-shaped portion of a pin or bush and, at the other end thereof, with a fixed shoulder so that, tightening or untightening the screw itself in said slider, the latter moves to-and-fro in said direction, the wire to be connected, in its clamping state, being locked between said plate-shaped portion and the slider inner surface opposite to the screwing hole of the clamping screw.

2. A clamping structure according to claim 1, characterized in that each of said box-type body is provided with a closure cover on the inner surface of which are recesses suitable to receive the plate-shaped ends of said pins and bushes.

3. A clamping structure according to claims 1 and 2, characterized in that said cover is provided with holes allowing the passage of the wires to be connected, which holes are substantially situated in correspondence with the center line of said housings in order to allow a centered locking of the wires in said sliders.

4. A clamping structure according to claim 1, characterized in that said slider has the shape of a quadrangular ring, provided with a threaded hole in the middle of one of its sides fitted for allowing the screwing of said clamping screw.

5. A clamping structure according to claim 4, characterized in that said slider is obtained through the bending of a metal strip, the end edges of which are overlapped and provided with mutually aligned threaded holes fitted for the screwing of said clamping screw.

6. A clamping structure according to one of claims 1 to 5, characterized in that said slider is provided, on its side opposite to said clamping screw, with a slit suitable to come into engagement with the end portion of the wire, so that it can partly penetrate into the slit for a better anchoring thereof.

7. A clamping structure according to one of claims 1 to 3, characterized in that said slider is provided with a projecting tongue by means of which the hole in which the wire has to be inserted is at least partly obturated, in order to avoid the latter from being introduced in a wrong position when the slider is moved towards the head of the clamping screw.

8. A clamping structure according to one of claims 1 to 7, characterized in that the parts of said housings adhere to the corresponding slider, so that they guide the same during its to-and-fro motion in a direction perpendicular to the axes of said pins or bushes.

9. A clamping structure substantially as hereinbefore described with reference to the accompanying drawings.

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